The developmental Physical Education group

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The Developmental Physical Education Group: An emergent collaborative self-study

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With ideas from complexity thinking becoming a feature within the education literature, it has attracted increasing attention in terms of the way it can help our understanding of the learning process (e.g. Morrison, 2010). Despite this attention, however, we have recognized a paucity of academic conversations focusing on the practical implications of complexity on teacher educators and how they themselves deliberate upon complexity principles. Consequently, we suggest greater insight is needed to understand how teacher educators negotiate and employ complexity principles in their work. Further we suggest this insight is particularly relevant as teacher educators have the intellectual remit to explore both the conceptual and applied possibilities of complexity. It is within this background that the Developmental Physical Education Group (DPEG) at the University of Edinburgh has, since 2001, been engaged in a long-term primary physical education (PE) project that was initially informed by ideas from ecological perspectives (Newell, 1986) and more recently by complexity thinking. While these efforts have generally been focused on curriculum, pedagogy and professional learning, a recent research interest has centred upon a collaborative self-study (Bullough & Pinnegar, 2001). The catalyst for this project in 2012 was the Group's somewhat chaotic attempt to introduce complexity principles to one of its University programmes. In order to set the context for this study, we present short overviews of the Group and its movement toward complexity thinking to support its various educational endeavours.

The group

The DPEG is a team of teachers and researchers who have transitioned into roles as teacher educators and have the goal of developing complexity-informed curriculum, pedagogy and professional learning within primary PE (Jess, Keay & Carse, 2014). As noted above, the group came together in 2001 following a successful grant application focused on the development of an early years (ages 4-7) movement approach. Since 2006, with a further grant secured from

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the Scottish Executive to develop a postgraduate qualification for primary teachers, the group expanded in size and now includes lecturers, researchers, PhD students, teaching associates and local authority managers who are primarily based in Edinburgh but also in England and the USA. As we discuss below, these various stakeholders continue to wrestle with complexity in order to apply this framework to diverse educational contexts.

Complexity thinking

By the mid-2000s, as the group continued to apply its primary PE ideas, it recognized a need to articulate how this work was being informed theoretically. While ideas from social constructivism, situated and ecological perspectives were increasingly introduced, the group was gradually attracted to complexity thinking (e.g. Prigogine, 1976). This view is based on the belief that complex systems are self-organizing and emergent phenomena that differ from the more traditional modernist view of systems as complicated pre-programmed entities focused on linear processes and certain outcomes. Crucially, self-organization and emergence does not mean 'anything goes', but represents a different way to view order and unpredictability as it seeks to explain how complex systems are able to balance the difference between uncertainty and the capacity to *'achieve their integrity and maintain it over time' (*Biesta, 2010, p. 5). Subsequently, while modernism presents a centrally-driven approach to learning focused on predictable outcomes, complexity proposes we need to develop a better understanding of the self-organization process as the key to influencing learning (Morrison, 2010). Viewing humans as complex systems suggests that they are active participants in an adaptive process that is self-organizing, collaborative and uncertain. We suggest this reflects a paradigm shift as it recognizes learning as an unpredictable and non-linear process that cannot be explained by simple rational models (Storey & Butler, 2013).

Building on these ideas, the group has grappled to understand how various complexity principles can help us make better sense of the learning process. These efforts have particularly concentrated on developing an understanding of the starting point of the learning process (Haggis, 2008) and also how the principles of self-organization, emergence, ambiguous boundaries, 'edge of chaos' and recursive elaboration influence and inform this learning process. As we discuss later, our early work was predicated on the view that learners meet many new development opportunities over time. From a complexity perspective, these new starting points are seen as the interaction between the learner as a self-organizer and the different boundaries created by the new task, the environment in which the task is being attempted and also by the learner's personal capacities. With each new starting point different learners react to these boundaries in their own self-organizing way; hence the notion of boundaries being 'ambiguous' and the implication that as learners engage with topics, their starting points will be different.

From these starting points, learning then moves through a process of recursive elaboration as learners re-visit tasks in different ways. Critically, this re-visiting process supports the deep learning that organizes knowledge into a conceptual framework so that it can be applied and transferred across different contexts (Bransford, Brown, & Cocking, 2000). As learners recursively engage this elaboration process they self-organise and adapt as they meet with ever-changing boundaries. As this process unfolds, learners' behaviours oscillate around the 'edge of chaos' as some efforts remain inside, others move around and others extend beyond the different boundaries. Over time, these different responses result in errors, consolidation and challenge as normal features of the learning process. Deep learning is therefore not a straightforward and linear process but is non-linear and recursive involving periods of consolidation, challenge and errors. These principles question traditional notions of learning as they move away from the transmission of set knowledges to passive recipients who learn in the same way towards a view that sees learners as active participants in an uncertain, non-linear process.

With this background, we used collaborative self-study to interpret how complexity principles have influenced our practices as teacher educators. We addressed the following questions:

1. How have complexity principles contributed to our work with children, teachers and university courses in physical education?

2. In what ways has collaborative self-study contributed to our understanding of the use of complexity principles in teacher education?

Methodology

The chapter aims to explore how the DPEG has worked to understand, share and apply complexity thinking in their practice. Drawing on self-study, the chapter examines the group's experiences in developing a deeper understanding of its academic and professional activity (Samaras, 2002), particularly the evolution of its collective pedagogical practices. The introduction of complexity thinking to these efforts has heralded a new way of conceptualizing teachers' work in the field by provoking new ways of organizing knowledge and fostering relationships *within* our own group. Self-study became a viable means of unpacking our work as practitioners attempting to transform both our own and teachers' practice. As Cuenca (2010) reminds us, self-study provides a means of reflecting on the shifting and diverse nature of "knowledge" as it is collaboratively constructed over time and is mostly "grounded in the belief that teacher knowledge is never fixed or finalized, but always in a state of becoming, thus worthy of investigation, exploration, and refinement" (p. 20).

The research design was further guided by LaBoskey's (2004) self-study characteristics i.e. self-initiation, improvement aimed, interactive, qualitative and relying on the teacher education community to judge its trustworthiness. The research was self-initiated because, individually and collectively, we were grappling with complexity as a theoretical perspective underpinning our practice. Although self-study was new to the group, and it took time to become comfortable openly discussing our personal perceptions, we came to the point where we formally used focus groups and interviews with each other. This parallels with Samaras and Freese (2009) who report how they "initially had a fear of sharing our work and making ourselves vulnerable—but as we moved to a feeling of openness and learning together, we found ourselves framing and reframing our understandings of self-study through our teaching and our application of self-study to our practice" (p.12). We concomitantly came to more systematically engage in conversations that enabled us to share and reflect on our experiences, support each other and move our thinking forwards.

To understand how complexity has influenced our practice, two main qualitative data collection sources were used: focus group interviews and individual interviews involving group members. These interviews were conducted with six members between 2012 and 2015. Pinnegar and Hamilton (2009) note that interviews are often used in self-study and that self-study researchers must carefully situate self, explore positionality, and attempt to walk alongside the interviewee (p. 117). As such, although the interviews were facilitated by the first and second authors, because we had worked collaboratively for many years, it was acknowledged collectively that these conversations would be similar to the discussions the group regularly engaged in as part of our day-to-day work. The focus group conversations were unstructured to enable ideas to flow freely (Cohen, Manion and Morrison, 2007), although prompts around complexity were included. The individual interviews were semi-structured and focussed on how group members used complexity principles in their practice and the challenges they faced. As such, we wanted to use self-study to improve our understanding of complexity so that we could apply it in our practice and share it with our students. Rather than operating within silos, as authors, we have collaborated to undertake this self study of our own practice but also interacted with others to get their perspective and compare and contrast this with our own thinking/experiences. Taking these aspects highlighted by LaBoskey (2004) into account, we endeavor to clarify the research process and seek to contribute to the validity and trustworthiness of the research by supporting the reader to determine the validity of the research.

Data analysis

Drawing on the data generated, interview transcriptions were analysed by the authors to make sense of the information as teacher educators simultaneously using and researching theory (Garbett, 2011). Data analysis involved the interpretation of meanings made by us and our colleagues (Miles and Huberman, 1994). Interpreting the data involved a constant process of "segmenting and

reassembling" the data, which required time for thinking about, discussing and doing analysis (Boeije, 2010, p. 77). To gain a "practical understanding of meanings and actions" within the data we listened to the interviews and read over the transcripts a number of times (Miles and Huberman, 1994, p. 8). Interview transcripts were immediately reviewed as they were generated in order to minimize the time between production and analysis, ensuring that both context and findings were fresh in our minds. The preliminary themes created out of this initial analytical process were subsequently shared across the research team. As ideas were discussed both face-to-face and electronically by email, several key ideas were formed that crystallized into certain compelling themes that are presented in this chapter. Simultaneously, in line with our growing knowledge of complexity theory over the years, these analytical categories were compared and contrasted with elements of the complexity literature. In general, this process of coding and category making seemed to progress in a relatively smooth manner across the research team as we had embarked upon many other related discussions during our teaching in various professional development settings. Yet, at times, our knowledge of complexity theory was nascent which meant that we sometimes struggled to articulate our findings in terms of how complexity theory was implemented. As our knowledge of complexity theory principles evolved, we were able to revisit the previous findings and data set in order to construct more robust lines of analysis presented below.

Findings and discussion

In this section we first reflect on the focus groups and then the individual interviews. Analysis of this data highlights the messy process the group has gone through to understand and apply complexity and ecological thinking in their practice. Findings from the 2012 focus group suggest that while the group was comfortable using an ecological perspective as the starting point for much of their practice, they were tentative about the complexity principles. Much of this uncertainty stemmed from the first author's attempt to introduce complexity principles to the postgraduate programme. This initial effort not only proved overwhelming for the students but also for most of the Group who struggled with the concepts and terminology and, in discussion, tended to only reflect on their own teaching practices (Jess, Atencio & Carse, under review). However, by 2014, the group members had entered a transitional phase in which they were more confident about the principles, more willing to share their views and also had started to draw upon the principles to inform their practice.

Building on this, the 2015 individual interviews suggested that the group had made progress in terms of articulating their emotional engagement with complexity and also their use of the principles to inform their practice. As demonstrated below, they talked more comfortably about how complexity influenced their views on learning and also how a combination of principles, namely self-organization, emergence, ambiguous boundaries, 'edge of chaos' and recursive elaboration, was now informing their practice. Having now worked with complexity for several years, George suggested the group had gone through "a real recursive elaboration of this whole process and I think because it's a relatively new area of study, I suppose you're reading things and you're picking things up each time you go". In terms of applying complexity, individual comments highlight how this iterative engagement now impacted on how the group approached learning in their practice. For example, Karen commented that:

> *understanding complexity theory has helped me to build my understanding of really what pedagogy is all about, how the children learn, how the learner learns, so not just talking specifically about children and the physical aspects but how students can learn, how teachers can learn.*

Rhona also reflected how complexity principles influenced the learning process, noting how "*I will watch children and I'll in my head say, yeah, self-organise, 'edge of chaos', you know. The words will come through in my thinking as I'm watching things and it's just there as part of my thinking now.*" Another comment from John crystallized how the Group now sought to "*live the complexity*" rather than simply think it over. Essentially, analysis of focus group and individual interview data highlighted how the group now shared a view of learning as a recursive process in which self-organizing learners interact within ever-changing boundaries. The group was now seeing the

principles as an integrating framework to inform the learning process.

Certain principles became particularly compelling to the group as exemplified in the comments below. While self-organization had been acknowledged for some time, the individual interviews marked the first time the group talked about their efforts to support this principle in their practice. Again emphasizing the value of complexity in terms of learning, George noted how the group was "changing bit by bit to realize that actually the more that we can support the development of those self-organizing effective skills individually and collectively is a really important part that perhaps we have all tended to ignore." Supporting learners' self-organization was now a common thread running through the interviews. For example, working as an educator in the USA, John highlighted how he was keen for his students "*to think of their learning journey in terms of this, sort of, self-organization concept which is that they can organise their lives and their learning trajectories in very different ways than they ever believed before*".

Further reflecting on how self-organization provides opportunities for learners to take ownership, Rhona discussed how she helped "the children to be able to self-organise and to be able to make decisions about where they're at and take responsibility for where they're at in whatever the learning task is". Karen and Louise also both recognized how this concept helped them understand the differences between learners. Notably, when Karen now approached her teaching, she knew that:

> *these individuals in front of me are actually making judgments, making thought processes and actually really acting and responding where they are cognitively, physically, socially and emotionally, that all these individuals are different. I mean, we know that, but actually they will self-organise, they will come on the journey with me or they will not.*

In a similar vein, taking a more personal view, Louise noted that:

> *If you understand you as a self-organiser, and the children as self-organisers, then it helps you to evaluate what's going on in front of you, and how things are happening, and that people are coming from different places so it helps you to recognise that, and understand that.*

The notion that learners respond differently is also captured by George when he highlights how self-organization results in emergent behaviour "*that leads to things that are predictable and unpredictable be that in a movement, in a social, an emotional, or in a cognitive way*."

Dovetailing with self-organization, the interviews indicated how the group was equally conscious of the ambiguity of the boundaries around which learners' self-organization took place and the role they, as teachers, play in manipulating the boundaries to influence the learning process. From Rhona:

> *(My) job is to set the boundaries up for the task and the environment and my knowledge of what I'm doing allows me to set the, sort of, the boundaries for them to be able to develop their learning and the more I can do that better, the more they're able to develop their learning as they, sort of, self-organise.*

Karen, however, felt that she needed *'courage'* to adjust her pedagogical strategies to:

> *extend the learners by pushing them to the boundaries, by being able to provide tasks that are wide tasks that will get lots of different possibilities, and by also narrowing tasks, pulling the learner in for a particular response that you might want, which doesn't necessarily mean you will get that particular response, but it's about having...for me, it's about having that ability to play around with the manipulation of tasks.*

Pedagogical decisions to design wide and narrow task boundaries now seemed to be a regular feature of the group's practice, as was placing learners within, towards and beyond these boundaries, or the 'edge of chaos'. For example, Rhona now noted, "I like the 'edge of chaos'. I like that because I understand that….. I like that idea of how we can just, you know, move around the edges of it, just to try and enhance your learning and to challenge yourself." William subsequently brought together the notion of ambiguous boundaries and the 'edge of chaos', suggesting that as a teacher:

> *you need to know when you need to narrow, when you need to widen, and sometimes you might want the children working really at the edge of those boundaries, working at that 'edge of chaos' to push them to get them thinking in different ways, to get that creativity come in.*

This increased awareness of the importance of manipulating boundaries was further accentuated when Louise suggested that "If you stay too long in the centre then it becomes too comfortable", while Karen noted the importance of "pushing the learner to the 'edge of chaos', letting them experience mistakes, setting up a comfortable environment for them to be able to make these mistake." Overall, the group's comfort and willingness to now take more pedagogical risks is best depicted by Louise who, after attempting a new designing games task with students, said:

> *it was brilliant, because there was stuff that didn't work. So, we reflected on it, and evaluated it, and I said to them this is why you can't just take something from a book, and accept it as this is how it's all going to work. You've got to engage with it, question it, try it out, trial and error, and if you don't try you won't know, and you've got to make yourself feel uncomfortable, and you've got to show that you're trying something new. So, yes, you've got to feel uncomfortable.*

Conclusion

Over several years, as the DPEG embarked on a new theoretical trajectory, this collaborative self-study involving focus group and individual interviews has helped us reflect how complexity thinking has influenced both our views on learning and our practice. While the early focus groups revealed our inward struggles to gain mastery over key concepts, the later interviews demonstrated how group members have developed their understanding of the complexity principles and are increasingly using these to inform their practice.

Group members, and an expanding number of affiliates, continue to refine and negotiate these principles as our roles, needs and conditions change. Reflecting the collaborative nature of our ongoing self-study, working with complexity has strengthened our view that we need to share and learn from others including those we teach and work with. More recently, an emerging theme has been the recognition that we are now putting complexity "into practice" and subsequently using these experiences to hone our understanding of the principles. Thus, the study highlights how a recursive process has been in play throughout the group's evolution as complexity principles influence both our collective thinking and our capacity to work in ways that are governed less by notions of control and certainty and more by self-organization, emergence and messiness. In conclusion, this iterative process seems to be helping the group push forward with its adaptive and innovative agenda within the dynamic conditions of postmodernity and to develop complexity thinking as part of a re-envisioning of primary PE.

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